LogoLISS - A Toy Language

LOGO **L**anguage of **I**ntegers, **S**equences and **S**ets

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1 Grammar

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/************************ Program

Liss                 --> "PROGRAM" identifier  "{" Body  "}"

Body                 --> "DECLARATIONS" Declarations
                         "STATEMENTS"   Statements


/************************ Declarations

Declarations         --> Declaration
                       | Declarations Declaration

Declaration          --> Variable_Declaration


/************************ Declarations: Variables

Variable_Declaration --> Vars "->" Type ";"

Vars                 --> Var
                       | Vars "," Var

Var                  --> identifier Value_Var

Value_Var            -->
                        | "=" Inic_Var

Type                 --> "INTEGER"
                       | "BOOLEAN"
                       | "SET"
                       | "ARRAY" "SIZE" number

Inic_Var             --> Constant
                       | Array_Definition
                       | Set_Definition

Constant             --> Sign number
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                       | string
                       | "TRUE"
                       | "FALSE"
Sign                 -->
                       | "+"
                       | "-"


/************************ Declarations: Variables: Array_Definition

Array_Definition     --> "[" Array_Initialization "]"

Array_Initialization --> Elem
                       | Array_Initialization "," Elem

Elem                 --> Sign number


/*********************** Declarations: Variables: Set Definition

Set_Definition          --> "{"
                             Set_Initialization
                            "}"

Set_Initialization      -->
                          | identifier "|" Expression


/************************* Statements

Statements           --> Statement
                       | Statements Statement

Statement            --> Turtle_Commands
                       | Assignment
                       | Conditional_Statement
                       | Iterative_Statement


/************************* Turtle Statement

Turtle_Commands      --> Step
                       | Rotate
                       | Mode
                       | Dialogue
                       | Location

Step                 --> "FORWARD" Expression
                       | "BACKWARD" Expression

Rotate               --> "RRIGHT"
                       | "RLEFT"

Mode                 --> "PEN" "UP"
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                       | "PEN" "DOWN"

Dialogue             --> Say_Statement
                       | Ask_Statement

Location             --> "GOTO" number "," number
                       | "WHERE" "?"


/************************* Assignment Statement

Assignment          --> Variable "=" Expression

Variable            --> identifier Array_Acess

Array_Acess         -->
                      | "[" Expression "]"


/*********************** Expression

Expression          --> Single_Expression
                      | Expression Rel_Oper Single_Expression

/******** Single_Expression

Single_Expression   --> Term
                      | Single_Expression Add_Op Term

/******** Term

Term                --> Factor
                      | Term Mul_Op Factor

/******** Factor

Factor              --> Constant
                      | Variable
                      | Set_Definition
                      | Member
                      | SuccOrPred
                      | "!" Expression
                      | "+" Expression
                      | "-" Expression
                      | "(" Expression ")"

/******** Operators

Add_Op              --> "+"
                      | "-"
                      | "||"
                      | "++"

Mul_Op              --> "*"
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                      | "/"
                      | "&&"
                      | "**"

Rel_Op              --> "=="
                      | "!="
                      | "<"
                      | ">"
                      | "<="
                      | ">="
                      | "in"

/******** SuccOrPredd

SuccOrPred          --> SuccPred identifier

SuccPred            --> "SUCC"
                      | "PRED"

/******** SetOper

Member             --> "ISMEMBER"  "(" Expression "," Variable ")"


/********************* IO Statements

Say_Statement      --> "SAY" "(" Expression ")"

Ask_Statement     --> "ASK" "(" string "," Variable ")"


/********************* Conditional & Iterative Statements

Conditional_Statement --> IfThenElse_Stat

Iterative_Statement   --> While_Stat

/******** IfThenElse_Stat

IfThenElse_Stat       --> "IF" Expression
                          "THEN" "{" Statements "}"
                          Else_Expression

Else_Expression       -->
                        | "ELSE" "{" Statements "}"

/******** While_Stat

While_Stat           --> "WHILE" "(" Expression ")" "{" Statements "}"
```